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Patent Application

Inventor: Ilya Feygin

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Title: Apparatus and Method for Investigating Chemical Entities

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

APPEAL BRIEF UNDER 37 CFR 41.67

Pursuant to 37 CFR 41.67, this brief is filed in support of the appeal in this application.

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(1) ***Real Party in Interest***

Application 10/769,220, which is the subject of this Appeal, has been assigned to TechElan.

(2) *Related Appeals and Interferences*

There are no other appeals or interferences that will directly affect, be directly affected by or otherwise have a bearing on the Board's decision in this Appeal.

(3) *Status of the Claims*

The application on appeal was filed with fifteen claims, all of which are still pending. Claims 1, 8, 12, and 13 were previously amended.

Each of the pending claims stand rejected. All of the rejected claims are being appealed.

It is notable that *substantive* arguments for patentability are presented for all pending independent claims (claims 1, 8, and 12) as well as some of the dependent claims (claims). The patentability of dependent claims will not be separately argued except to note that they are allowable based on their dependency on an allowable base claim.

(4) *Status of Amendments*

No Amendments have been filed subsequent to the final rejection of the claims.

(5) ***Summary of the Claimed Subject Matter***

The claimed subject matter pertains to an apparatus and method for determining the structural parameters of unknown chemical entities through binding interactions.

<u>Background</u>

The structure of a complex chemical entity (*e.g.*, proteins, *etc.*) can be decoded via its binding activity with known chemical entities (*e.g.*, small molecules). But this requires the investigation of a very large number of such interactions. Current technologies (*e.g.*, fluorescent assays, *etc.*) and equipment for decoding the structure of proteins through binding require complex equipment and extensive development of assays as well as the selection of proper fluorescent labels. Other techniques, which decode structures directly (*i.e.*, without binding) are very complex (*e.g.*, mass spectrometers, *etc.*) and denature proteins in the process.

<u>Appellant's Claimed Invention</u>

Appellant's claimed invention is directed to a relatively simple, low-cost, and high-throughput apparatus that is capable of monitoring binding interactions and obtaining the data required for identifying unknown chemical entities.

The inventor recognized that decoding of proteins through various binding interactions (*e.g.*, protein/protein, protein/small molecule-drug, protein/antibody, protein/peptide, *etc.*) by monitoring slight energy-level variations during binding is feasible using a ratiometric (comparative) evaluation of these events through thermal balance (*i.e.*, infrared-radiation level).

It is very difficult to measure absolute changes in thermal-energy variations during binding. Doing so requires special calorimetric chambers. But it is possible to monitor very small *differences* in activity between reference "blank" sites and other unknown sites that are being investigated. This *ratiometric* approach is valid only if substantially all other parameters that affect the thermal balance are constant and if the events under investigation are taking place simultaneously.

In accordance with the claimed invention, an apparatus for monitoring and obtaining data on binding interactions includes an IR sensor (108), a sliding separator (110), and IR-transmitting fibers (102) that are optically coupled, at a first end thereof, to the IR sensor. (*See*, FIGs. 1, 4.)

In operation, the sliding separator adjusts the spacing between fibers as is required for interfacing the second end of the fibers with any of a variety of sample carriers (112). In some embodiments, the second end of the fibers is physically adapted to capture and immobilize chemical entities that are contained in the sample carriers.

After the chemical entities are engaged to the second end of the fibers, they are brought into contact with a binding compound. If binding activity occurs, a "thermal" signal indicative thereof will be transmitted through the fiber to the IR sensor. Since ambient conditions are identical for all fibers, even the slightest fiber-to-fiber variations in activity will be noticeable. In some embodiments, unknown chemical entities can be identified by analysis of the thermal signals.

The claimed invention therefore investigates binding activity directly, through its thermal signature. As a consequence, the claimed invention is a "label-free" technology, in that it does not require special assay development and labeling. The claimed device provides an opportunity for massively-parallel investigation of binding activities by monitoring thermal emission from hundreds or thousand of separate sites.

Mapping of Claims to the
Language of the Specification

Independent claim 1 recites an apparatus comprising:

> a plurality of optical fibers, wherein:
> said optical fibers each having a first end and a second end;
> said fibers are capable of transmitting infrared radiation ("IR");
> a sensor for sensing IR, wherein said sensor is in IR-sensing contact with said first end of each of said optical fibers;
> a separator, wherein said separator engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to physically engage individual samples on a sample plate.

- A plurality of optical fibers capable of transmitting of IR: *see*, paras. [0016]-[0017] and FIG. 1.
- A sensor for sensing IR, wherein the ensor is in IR-sensing contact with the first end of each fiber: *see*, paras. [0018]-[0019] and FIG. 1.
- A separator for engaging the fibers and spatially separating them from one another: *see*, para. [0023] and FIG. 1.

Independent claim 8 recites a method comprising:

> physically engaging a chemical entity to a first end of an IR-transmitting fiber;
>
> bringing said chemical entity in contact with a binding compound; and
>
> conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

- Physically engaging a chemical entity to a first end of an IR-transmitting fiber: *see*, paras. [0020]-[0022].
- Bring the chemical entity into contact with a binding compound: *see*, paras. [0024]-[0025].
- Conducting a thermal signal to a thermal sensor: *see*, para. [0026].

Independent claim 12 recites a method comprising:

> positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between adjacent IR-transmitting fibers at a sampling end thereof; and
>
> conducting a thermal signal through at least one of said IR-transmitting fibers.

- Positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between adjacent fibers at a sampling end thereof: *see*, para. [0023].
- Conducting a thermal signal through at least one IR-transmitting fiber: *see*, para. [0026].

(6) *Grounds of Rejection to be Reviewed on Appeal*

The grounds of rejection to be reviewed are as follows:

(a) Whether claims 8 and 10 were properly rejected under 35 USC §102 as being anticipated by U.S. Pat. No. 6,157,442 to Raskas.

(b) Whether claims 1 and 3-7 were properly rejected under 35 USC §103 as being obvious over the combination of U.S. Pat. Nos. 5,814,524 to Walt *et al.*, 5,980,120 to Narayannan, and Raskas.

(c) Whether claim 1 was properly rejected under 35 USC §103 as being obvious over the combination of Walt *et al.*, Raskas, and U.S. Pat. No. 5,625,737 to Saito.

(d) Whether claim 2 was properly rejected under 35 USC §103 as being obvious over the combination of Walt *et al.*, Narayannan, Raskas, and U.S. Pat. No. 3,368,247 to Orban.

(e) Whether claims 9 and 12-15 were properly rejected under 35 USC §103 as being obvious over the combination of Walt *et al.* and Saito.

(f) Whether claim 11 was properly rejected under 35 USC §103 as being obvious over Raskas.

It is to be noted that the patentability of the dependent claims will not be separately argued except to note that they are allowable based on their dependency on an allowable base claim.

(7) *Argument*

7.1 Claims 8 and 10 were improperly Rejected under 35 USC §102 as being anticipated by Raskas

Independent claim 8 recites a method comprising:

> physically engaging a chemical entity to a first end of an IR-transmitting fiber;
>
> bringing said chemical entity in contact with a binding compound; and
>
> conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

The Examiner rejected independent claim 8 over a patent to Raskas. Raskas discloses a device that measures a concentration of a liquid sample. Raskas' device comprises a light source (30), an optical fiber (34), a tip device (38), a detector (42), and a computer (44). (*See* FIG. 2.) The tip (38) is treated with a chemical coating (*e.g.*, a dye, *etc.*) that is intended to interact with the sample of interest. (Col. 4, line 57 – Col. 5, line 17.)

In operation, the tip (38) is placed in the liquid sample. The chemical coating and the sample react, and the color of the coating changes. Meanwhile, the light source (30) generates a beam of light that is transmitted via fiber (34) to the tip (38). The color of that light beam changes due to the change in color of the coating. With reference to FIG. 2, the color of incoming light beam (36) will therefore be different than outgoing light beam (40). That difference in color is quantified by the detector (42). Once quantified, the signal is provided to the computer (44), which determines the concentration of the chemical being sensed. (*See*, Col. 5, lines 18-37.)

Raskas does not disclose (1) an IR-transmitting fiber, (2) a binding compound, (3) a thermal signal, or (4) a thermal sensor. And, in fact, Raskas does not practice any of the method steps recited in claim 8.

With regard to item (1), in appellant's invention, the heat released during a binding reaction is conveyed to a detector by an IR-transmitting fiber. That is, electromagnetic radiation in the IR range is transmitted through the fiber. This EM in the IR range is referred to as a "thermal signal." As a consequence, appellant's claims require the use of a fiber that is suitable for transmitting radiation in the infrared range. Applicant refers to such fiber as an

"IR-transmitting fiber." Appellant identifies suitable, commercially available IR-transmitting fibers, including chalcogenide glass, polycrystalline IR ("PIR") fibers, and heavy metal fluoride glass ("HMFG"). (Para. [0017].)

Raskas does not disclose the use of an IR-transmitting fiber. To the extent that some small amount of infrared radiation could be propagated through a standard optical fiber, such a fiber is not suitable for use in conjunction with applicant's invention. Appellant recognizes that the Examiner is tasked to apply the broadest reasonable interpretation of the claim language. Appellant also recognizes that it is not appropriate to read limitations from the description into the claims. But it is equally clear that the description is the most appropriate source of information for interpreting the claim language. In the context of appellant's disclosure, it is not *reasonable* to interpret the phrase "IR-transmitting fiber" to include the conventional optical fiber used by Raskas.

Raskas makes no mention of IR-transmitting fiber, and, indeed, would have no use for such speciality fiber. As a consequence, Raskas does NOT disclose the step of "physically engaging a chemical entity to a first end of an IR-transmitting fiber."

Regarding item (2), Raskas makes no mention of a "binding compound" or, for that matter, binding interactions. Therefore, Raskas doesn't disclose the step of "bringing said chemical entity in contact with a binding compound."

Regarding items (3) and (4), Raskas is not monitoring thermal events; rather, Raskas is monitoring color change. The signal that Raskas transmits is not a "thermal signal," (*i.e.*, not electromagnetic energy in the infrared range). Rather, Raskas transmits an optical signal, the frequency of which is in the visible range, since "colors" are being distinguished by the sensor. Since Raskas is not concerned with IR generating events, he does not use a thermal sensor for monitoring. Raskas does not, therefore, disclose the step of "conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber."

For these reasons, appellant believes that claim 8 is not anticipated by Raskas. Appellant therefore requests that the Board reverse the Examiner's Section 102 rejection of claim 8.

The Examiner also rejected claim 10 under Section 102 and Raskas. The rejection of this claim should be reversed since claim 10 is dependent on claim 8, which, as demonstrated above, is not anticipated by Raskas.

7.2 Claims 1 and 2-7 were improperly rejected under 35 USC §103 as being obvious over Walt et al., Narayannan, and Raskas

Independent claim 1 recites an apparatus comprising:

> a plurality of optical fibers, wherein:
>
> said optical fibers each having a first end and a second end;
>
> said fibers are capable of transmitting infrared radiation ("IR");
>
> a sensor for sensing IR, wherein said sensor is in IR-sensing contact with said first end of each of said optical fibers;
>
> a separator, wherein said separator engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to physically engage individual samples on a sample plate.

The Examiner's conclusion that the combination of Walt *et al.*, Narayannan, and Raskas obviates claims 1-7 is incorrect. This conclusion is based on a mischaracterization of the references, a proffered "motivation to combine" that flies in the face of the intent of the cited art, and incorrect application of patent law. Raskas has already been discussed in section 7.1; Walt *et al*. and Narayannan are discussed below.

The Walt *et al*. apparatus comprises a unitary fiber optic array, a GRIN lens coupled to the array, a remotely-positioned solid substrate, a plurality of light-energy absorbing indicator ligands, as well as several other elements, as listed in col. 5 of that reference.

To make optical measurements, *etc.*, the end of the imaging fiber that is remote from the GRIN lens is coupled to an assembly comprising lenses, a CCD camera, *etc.*, as depicted in FIG. 8 and discussed at col. 15, lines 18-47.

In operation, excitation light from light source (500) is conducted to a reaction substrate through imaging fiber (300). Furthermore, fluorescence, *etc.*, resulting from reaction at the reaction substrate is conducted through imaging fiber (300) to the ccd camera (512). (*See* also FIG. 9, note: the imaging fiber (300) is the combination of the array (100) plus GRIN lens (200).)

With regard to the reaction that is being monitored, Walt *et al.* disclose a large number of "light-energy absorbing indicator formulations" in Tables 4 and 5 at cols. 18 and 19. All such compounds emit light at wavelengths below 700, and most typically between 500 to 600 nanometers. According to Wikipedia, infrared radiation has wavelengths between about 750 nm and 1 mm. These EM being emitted during a reaction with these ligands is not, therefore, in the infrared range.

Several important points about Walt *et al.* are that:

A. The fiber optic array (100) is a preformed bundle composed of a plurality of fibers (102). (*See, e.g.*, Fig. 3.) The discrete unitary optic array has a <u>fixed and determinable configuration and set dimensions</u>." (Emphasis added, col. 9, lines 58-65, *see also*, col. 8, lines 11-15.)

   In preferred embodiments, the fibers in the array are straight relative to one another (FIG. 3), such that the end faces of the fibers are correlatable to one another via a two-dimensional coordinate system (FIGs. 4 and 5). (Col. 10, lines 1-38.) In some less-preferred embodiments, the arrangement of fibers can be random. In such embodiments, light would have to be injected into each fiber, on a fiber-by-fiber basis, to determine how the two end faces correlate to one another. (Col. 10, line 48 – col. 11, line 19.)

   But regardless of the whether the fibers are straight or random, they are in a fixed position relative to one another in the array.

B. Walt *et al.* explicitly discloses that the target or object being viewed is NOT in contact with an optical fiber in the optical array: "the object being viewed is not to be in direct contact with the imaging fiber, but instead lies remote from the imaging fiber within a pre-set range of distances." (Col. 6, lines 58-61.) This is enabled by a GRIN lens, which is disposed on the end of the fiber. Walt *et al.* characterizes the GRIN lens as an essential element of the inventive combination (col. 6, lines 32-36) and expounds on its advantages col. 6, lines 53-64.

   In this regard, Walt *et al.* note, at col. 13, lines 19+, the benefits of their far-field approach:

   > To obtain an image with an optical imaging fiber, the fiber must be held in direct contact with the target. <u>This limits the field of view to the size of the imaging fiber</u> …. In contrast, by coupling a GRIN lens to an optical fiber, the

> field of view is expanded greatly.... Therefore, the object does not have to be in direct contact with the optical fiber-lens system. (Emphasis added.)

C. Walt *et al.* are monitoring reactions that emit light in the visible range.

The secondary reference, Narayannan, is directed to a fiber array test method and apparatus. This apparatus, which is best shown in FIG. 4, is used to verify that optical fibers within a fiber array are properly situated.

The salient features of the apparatus include light source (84), fiber array (51), a plurality of optical fibers (65), fixture (86), and optical sensor (89). In operation, fiber array (51) is aimed at sensor (89). Light is introduced, via light source (84), into the individual fibers one at a time and projected, as a spot (92), onto the sensor. The center positions of the light projections are determined relative to each other using a computer that receives the light-positioning data from the sensor. The fiber array is then accepted or rejected depending upon whether the position of the optical fibers meet a predetermined tolerance. (Col. 2, lines 45-57.)

As an initial matter, it seems questionable, to say the least, that one skilled in the art could somehow combine Walt *et al.*, Narayannan, and Raskas, to arrive at appellant's claimed invention. In other words, how could applicant's claimed invention possibly be distilled from these references (even using the benefit of hindsight)? Not to mention the issue of "what would motivate the combination?"

We now address the specifics of the Examiner's allegations. The Examiner alleges, among other things, that Walt *et al.* teaches a plurality of optical fibers that are capable of transmitting IR and a sensor for sensing IR, citing to col. 1, lines 62-67. Appellant disagrees.

Walt *et al.* does not teach an apparatus that comprises IR-transmitting fibers. The passage cited by the Examiner appears in the "Background" section of the Walt *et al.* specification. That passage discusses how to make an optical fiber into a chemical sensor through the use of light-energy absorbing dyes. Although Walt *et al.* define "light-energy," in that background passage, to include IR among other wavelength bands, there is no indication whatsoever in the Summary or Detailed Description sections that Walt *et al.* contemplate monitoring anything other than "light" in the visible range of the EM spectrum. In this regard, Walt *et al.* disclose the use of indicator ligands that emit in the visible range (*see*,

Tables 4 and 5) and further disclose only conventional optical fiber for use in conjunction with their invention. (Col. 8, lines 34-39.)

The Examiner further alleges that the motivation for combining Narayannan and Raskas with Walt *et al.* is to "allow direct contact with the sample and allow for more than one wavelength to be measured independently of one another." Also, "without direct contact of the optical fiber with the sample, light from the external environment would poorly influence the image collected at a far field position."

It is not understood how these arguments could serve as the "motivation" for modifying Walt *et al.* by Narayannan or Raskas. As previously discussed, a primary purpose of Walt *et al.* is to provide FAR FIELD viewing and measurements. Walt *et al.* teaches away from anything but far field viewing.

The Examiner also alleges that Narayannan discloses a separator, as recited in applicant's claim 1, which is suitable for spatially separating optical fibers in a pattern that enables the optical fibers to engage samples on a sample plate. The Examiner cites to col. 6, at lines 50-56.

With reference to FIG. 4 and the cited passage, it seen that fiber array (51) is held by fixture (86) proximal to the sensing surface of sensor (89). Presumably, the Examiner is characterizing fixture (86) as applicant's "separator."

It seems inappropriate to characterize fixture (86) a "separator," since it doesn't appear to separate anything. More to the point, fixture (86) does not and cannot provide the functionality recited for applicant's separator. In particular, fixture (86) does not "spatially separate" fibers from one another as recited in claim 1. The position of each fiber in the fiber array (51) is fixed. In fact, that's the point of the Narayannan's invention — to determine if the fibers are properly located in the array. Rather, fixture (86) simply fixes fiber array (51) in position in front of the sensor.

And it is notable that Walt *et al.* could NOT even use a separator that "spatially separates" fibers from one another as recited in claim 1. The position of the fibers in the optical array of Walt *et al.* is and must be fixed, as previously discussed.

But the Examiner states that he is not constrained by the claim language pertaining to the separator, as recited in claim 1. Rather, the Examiner pronounces that claim 1 is "an intended use claim," and the "intended use for the sensor, the separator, and optical fibers does not give weight to the patentability of the claimed apparatus."

Regarding the separator, claim 1 recites:

> a separator, wherein said separator engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to physically engage individual samples on a sample plate

This language is not merely "intended use" nor is it proper to characterize the claim as an "intended use" claim. Rather, the claim language pertaining to the separator is a FUNCTIONAL definition of the separator.

The use of functional limitations is explicitly approved in MPEP 2173.05(g). As stated in the MPEP:

> A functional limitation is an attempt to define something <u>by what it does</u>, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). (Emphasis added.)

The limitations pertaining to the separator do define the separator by "what it does." As recited in claim 1, the separator: (1) engages the fibers, (2) is suitable for spatially separating the fibers, and (3) separates the fibers in a pattern that enables the fibers to physically engage individual samples.

A "use" claim is distinct from "functional" claim language. The MPEP addresses "use" claims in Section 2173.05(q); the issue typically arises in the context of method claims. In this Section, the MPEP states that:

> attempts to claim a process without setting forth any steps involved in the process generally raises an issue of indefiniteness under 35 U.S.C. 112, second paragraph. For example, a claim which read: "A process for using monoclonal antibodies of claim 4 to isolate and purify human fibroblast interferon." was held to be indefinite because it merely recites a use without any active, positive steps delimiting how this use is actually practiced. Ex parte Erlich, 3 USPQ2d 1011 (Bd. Pat. App. & Inter. 1986).

Appellant's claim is an apparatus claim that recites discrete elements and a relationship between them. The fact that one of the elements is defined in functional language does not render the claim indefinite or permit the Examiner to ignore the functional limitations, dismissing them as "intended use." The claim clearly identifies the boundaries on the protection sought.

The combination of Walt *et al.*, Narayannan and Raskas does not disclose or suggest what is recited in claim 1, nor is it even appropriate to make the combination. As a consequence, claim 1 is allowable over these references. By virtue of their dependence on claim 1, claims 2 through 7 are likewise allowable.

Appellant therefore requests that the Board reverse the Examiner's Section 103 rejection of claims 1-7 over Walt *et al.*, Narayannan and Raskas.

7.3 Claim 1 was improperly rejected under 35 USC §103 as being obvious over Walt et al., Raskas and Saito

As an alternative to his rejection of claim 1 under Walt *et al.*, Narayannan, and Raskas, the Examiner alleges that claim 1 is also obvious over the combination of Walt *et al.*, Raskas, and Saito.

Saito discloses an optical fiber holder. According to the reference, the holder maintains the fibers in fixed order relative to each other regardless in variations in the diameter of the fibers. Furthermore, Saito discloses that the holder can be used to unravel fibers. The unraveling functionality is illustrated in FIGs. 7A-7C.

FIG. 7A depicts several entwined fibers (6), which are coupled to connector (8). FIG. 7B depicts fiber holder (20) being slid towards the entangled fibers to unravel them. Once unraveled, the fiber holder (20) is slid in the opposite direction, as shown in FIG. 7C.

The Examiner alleges that it would be obvious to modify the combination of Walt *et al.* and Raskas with Saito because using Saito's separator reduces the chances of fibers becoming bent or broken and reduces signal loss.

Based on the foregoing discussion of Walt *et al.* and Raskas, it seems clear that modifying Walt *et al.* and Raskas with Saito would not yield appellant's claimed invention. Furthermore, it is not even understood how Saito's holder could be used in conjunction with either of the other references.

The combination of Walt *et al.*, Raskas and Saito do not disclose or suggest what is recited in claim 1, nor is it appropriate to make the combination. As a consequence, claim 1 is allowable over these references. Appellant therefore requests that the Board reverse the Examiner's Section 103 rejection of claim 1 over Walt *et al.*, Raskas and Saito.

7.4 Claim 2 was improperly rejected under 35 USC §103 as being obvious over Walt et al., Narayannan, Raskas and Orban

The Examiner alleges that the combination of Walt *et al.*, Narayannan, and Raskas teach all limitations of claim 1, and Orban teaches the limitation recited in claim 2.

As explained in Section 7.2, the combination of Walt *et al.*, Narayannan, and Raskas does not teach the limitations of claim 1. And including Orban to the mix does nothing to cure that deficiency. Therefore, since claim 1 is allowable over the combination of these four references, claim 2 is likewise allowable.

Appellant therefore requests that the Board reverse the Examiner's Section 103 rejection of claim 2 over Walt *et al.*, Narayannan, Raskas, and Orban.

7.5 Claims 9 and 12-15 were improperly Rejected under 35 USC §103 as being Obvious over Walt et al. and Saito

The Examiner alleges that Walt *et al.* teaches all limitations of claim 8 and that Saito teaches the limitation recited in claim 9.

It is believed that the Examiner intended to reject these claims over the combination of Raskas and Saito, since the Examiner alleged that claim 8 was anticipated by Raskas, not Walt *et al.*

As explained in Section 7.1, Raskas does not anticipate claim 8. The addition of Saito adds nothing that would compel a finding that the combination of Saito and Raskas obviates claim 8. Therefore, since claim 8 is allowable over the combination of Raskas and Saito, claim 9 is likewise allowable over these references.

For completeness, appellant notes that neither Walt *et al.*, nor the combination of Walt *et al.* and Saito obviates claim 8 or claim 9.

Independent claim 12 recites a method comprising:

> positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between adjacent IR-transmitting fibers at a sampling end thereof; and
>
> conducting a thermal signal through at least one of said IR-transmitting fibers.

As discussed in Sections 7.1 and 7.2, none of the references disclose conducting a "thermal" signal (EM in the IR range) through an IR-transmitting fiber.

Furthermore, neither Saito nor any other reference discloses positioning a movable separator along a plurality of <u>IR-transmitting fibers</u> to obtain a desired spacing between adjacent fibers <u>at a sampling end</u> thereof.

Appellant therefore requests that the Board reverse the Examiner's Section 103 rejection of claim 12 over Raskas and Saito (or Walt *et al.* and Saito). Since claims 13-15 are dependent on claim 12, they are likewise allowable over the cited art. The Board is therefore requested to reverse the rejection of dependent claims 13-15 as well.

7.6 Claims 11 was improperly rejected under 35 USC §103 as being Obvious over Raskas

The Examiner alleges that Raskas teaches the method of claim 8, but does not teach the limitation that is recited in claim 11 regarding "inserting said first end of said IR-transmitting fiber into a well after engaging said chemical entity." But the Examiner is of the opinion that it would be obvious to conduct this step.

As shown in Section 7.1, claim 8 is allowable over Raskas. Therefore, claim 11 is likewise allowable over Raskas. The Board is therefore requested to reverse the rejection of dependent claim 11 over Raskas.

(8) *Conclusion*

The appellant has demonstrated that the logic underlying the Examiner's rejections is untenable, and, therefore, that the rejections are not sustainable. For this reason, the appellants respectfully request the Board of Appeals to reverse the decision of the Examiner as provided for in 37 C.F.R. 41.50(a).

Respectfully,
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(9) *Claims Appendix*

1. (Previously Presented) An apparatus comprising:

a plurality of optical fibers, wherein:

said optical fibers each having a first end and a second end;

said fibers are capable of transmitting infrared radiation ("IR");

a sensor for sensing IR, wherein said sensor is in IR-sensing contact with said first end of each of said optical fibers;

a separator, wherein said separator engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to physically engage individual samples on a sample plate.

2. (Original) The apparatus of claim 1 further comprising a collar for bundling said optical fibers.

3. (Original) The apparatus of claim 1 wherein said second end of said optical fibers are physically adapted to receive a first chemical entity.

4. (Original) The apparatus of claim 3 wherein said individual samples comprise said first chemical entity.

5. (Original) The apparatus of claim 1 further comprising a surface having a binding compound disposed thereon.

6. (Original) The apparatus of claim 1 wherein said first end of said optical fibers are physically coupled to said sensor.

7. (Original) The apparatus of claim 1 wherein said separator is engaged to said plurality of fibers such that it can slide along said plurality of fibers.

8. (Previously Presented) A method comprising:

physically engaging a chemical entity to a first end of an IR-transmitting fiber;

bringing said chemical entity in contact with a binding compound; and

conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

9. (Original) The method of claim 8 further comprising sliding a separator along said IR-transmitting fiber.

10. (Original) The method of claim 8 wherein engaging a chemical entity further comprises inserting said first end of said IR-transmitting fiber into a sample carrier.

11. (Original) The method of claim 8 wherein bringing said chemical entity in contact with a binding compound further comprises inserting said first end of said IR-transmitting fiber into a well after engaging said chemical entity.

12. (Previously Presented) A method comprising:

positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between adjacent IR-transmitting fibers at a sampling end thereof; and

conducting a thermal signal through at least one of said IR-transmitting fibers.

13. (Previously Presented) The method of claim 12 further comprising engaging a chemical entity to said sampling end of said IR-transmitting fibers.

14. (Original) The method of claim 13 further comprising bringing said chemical entity into contact with a binding compound.

15. (Original) The method of claim 12 wherein conducting a thermal signal further comprises conducting said thermal signal to a thermal sensor.

(10) *Evidence Appendix*

No evidence submitted pursuant to 37 CFR §§1.130, 1.131, or 1.132.

(11) ***Related Proceedings Appendix***

There are no related proceedings.